# CLAIMS

1. A method for modifying a planar image slice in a CT scanner having a predetermined reconstruction angle, comprising:

reconstructing an image of the slice using initial X-ray attenuation data acquired along an initial scan path sector; and

modifying the image to provide a modified image of the slice, responsive to additional X-ray attenuation data acquired along an additional scan path sector in a vicinity of the axial position of the slice, the sector having an angular extent substantially less than the reconstruction angle.

2. A method according to claim 1, and comprising defining a region of interest within the image slice, wherein modifying the image comprises modifying only a portion of the image corresponding to the region of interest.

3. A method according to claim 2, wherein defining the region of interest comprises identifying an object of interest and altering the region of interest in response to movement of the object.

4. A method according to claim 3, wherein altering the region of interest in response to movement of the object comprises determining a characteristic of the X-ray attenuation data indicative of the position of the object, and shifting the region of interest in response to a change is the characteristic.

5. A method according to claim 4, wherein determining the characteristic of the X-ray attenuation data comprises finding a maximum value of the data within a data window corresponding to the region of interest.

6. A method according to claim 5, wherein finding the maximum value of the data comprises pre-processing the data and finding a maximum value of the pre-processed data.

7. A method according to claim 1 ~~any of the preceding claims~~, wherein the data acquired along the initial and additional scan path sectors comprises multi-slice data acquired along the sectors of the scan path.

8. A method according to claim 1 ~~any of the preceding claims~~, wherein data acquired along the sectors of the scan path comprises data acquired along sectors of a helical scan path.

9. A method according to claim 7, wherein data acquired along the scan path sectors comprises data acquired along sectors of a generally circular scan path substantially within a plane at the axial position of the slice.

10. A method according to claim 1, wherein modifying the image responsive to the additional attenuation data comprises processing the additional attenuation data and the initial attenuation data to produce an image data matrix and adding the matrix to the image.

11. A method according to claim 10, wherein processing the attenuation data to produce the image data matrix comprises:

back-projecting attenuation values calculated from the additional data, to determine a first preliminary matrix;

back-projecting attenuation values calculated from the initial data that were acquired in a portion of the initial scan path sector corresponding to the additional scan path sector, to determine a second preliminary matrix; and

subtracting the second preliminary matrix from the first preliminary matrix to produce the image data matrix.

12. A method according to claim 10, wherein processing the attenuation data to produce the image data matrix comprises:

calculating initial attenuation values from the initial data that were acquired in a portion of the initial scan path sector corresponding to the additional scan path sector;

calculating additional attenuation values from the additional data;

subtracting the initial attenuation values from the additional attenuation values to determine difference values; and

back-projecting the difference data to produce the image data matrix.

13. A method for producing a CT image of a region of interest within the body of a subject, comprising:

reconstructing a CT image of a slice of the body;

defining the region of interest; and

updating the CT image only in the region of interest, wherein the image of the region of interest encompasses only a portion of the CT image of the slice.

14. A method according to claim 13, and comprising superimposing the CT image of the region of interest on another CT image encompassing a substantially greater portion of the cross-sectional area.

Sub A2 15. A method according to claim 14 wherein the updated image of the region of interest is produced utilizing the method of any of claims 1-12.

16. A method according to ~~any of claims 13-15~~ claim 13 wherein the region of interest is determined based on an expectation of change in the CT image in the region of image.

17. A method according to ~~any of claims 13-16~~ claim 13, and including identifying an object of interest and wherein defining the region of interest comprises defining the region of interest in response to a determination of the position of the object of interest.

18. A method according to claim 17 and comprising altering the region of interest being reconstructed in response to movement of the object.

19. A method according to claim 18, wherein altering the region of interest in response to movement of the object comprises determining a characteristic of the X-ray attenuation data indicative of the position of the object, and shifting the region of interest being reconstructed in response to a change in the characteristic.

20. A method according to claim 19, wherein determining the characteristic of the X-ray attenuation data comprises finding an extremum value of the data within a data window corresponding to the region of interest.

21. A method according to claim 20, wherein finding the extremum value of the data comprises preprocessing the data and finding a maximum value of the pre-processed data.

22. A method according to ~~any of claims 17-21~~ claim 17 wherein the CT image is a multi-slice image and wherein the position of the slices are determined based on a determination of the position of the object with respect to the slices.

23. A method of determining an optimal position for multiple CT slices, comprising:

reconstructing the multiple slices based on a first set of data;

determining the position of an object in the slices;

then reconstructing the slices based on the determined position.

24. A method according to ~~any of claims 17-23~~ claim 17 wherein the object is a biopsy needle.



AMENDED SHEET

25. An imaging method for the determination of the position of a biopsy needle comprising:

reconstructing a CT image from a plurality of views;

determining the position of the biopsy needle in the image; and

determining a region of interest based on the determined position of the biopsy needle.

26. An imaging method according to claim 25 and including periodically updating the image only in the region of interest.

27. An imaging method for imaging a region in a region of interest in which changes are expected comprising:

reconstructing a CT image from a plurality of views; and

periodically modifying the image only in the region of interest.

28. An imaging method according to any of claims 13-22, 26 or 27 wherein the image is periodically modified utilizing the method of any of claims 1-12.

29. A CT scanner having a predetermined reconstruction angle, comprising:

means for reconstructing an image of the slice using initial X-ray attenuation data acquired along an initial scan path sector; and

means for modifying the image to provide a modified image of the slice, responsive to additional X-ray attenuation data acquired along an additional scan path sector in a vicinity of the axial position of the slice, the sector having an angular extent substantially less than the reconstruction angle.

30. A scanner according to claim 29, and comprising means for defining a region of interest within the image slice, wherein the means for modifying the image comprises means for modifying only a portion of the image corresponding to the region of interest.

31. A scanner according to claim 30, wherein means for defining the region of interest comprises means for identifying an object of interest and altering the region of interest in response to movement of the object.

32. A scanner according to claim 31, wherein the means for altering the region of interest in response to movement of the object comprises means for determining a characteristic of the X-ray attenuation data indicative of the position of the object, and for shifting the region of interest in response to a change is the characteristic.

33. A scanner according to claim 32, wherein the means for determining the characteristic of the X-ray attenuation data comprises means for finding a maximum value of the data within a data window corresponding to the region of interest.

34. A scanner according to claim 33, wherein the means for finding the maximum value of the data comprises means for pre-processing the data and for finding a maximum value of the pre-processed data.

35. A scanner according to any of claims 29-34, wherein the data acquired along the initial and additional scan path sectors comprises multi-slice data acquired along the sectors of the scan path.

36. A scanner according to any of claims 29-35, wherein data acquired along the sectors of the scan path comprises data acquired along sectors of a helical scan path.

37. A scanner according to claim 35, wherein data acquired along the scan path sectors comprises data acquired along sectors of a generally circular scan path substantially within a plane at the axial position of the slice.

38. A scanner according to any of claims 29-37, wherein said means for modifying the image responsive to the additional attenuation data comprises means for processing the additional attenuation data and the initial attenuation data to produce an image data matrix and adding the matrix to the image.

39. A scanner according to claim 38, wherein the means for processing the attenuation data to produce the image data matrix comprises:

means for back-projecting attenuation values calculated from the additional data, to determine a first preliminary matrix;

means for back-projecting attenuation values calculated from the initial data that were acquired in a portion of the initial scan path sector corresponding to the additional scan path sector, to determine a second preliminary matrix; and

means for subtracting the second preliminary matrix from the first preliminary matrix to produce the image data matrix.

40. A scanner according to claim 29, wherein the means for processing the attenuation data to produce the image data matrix comprises:

means for calculating initial attenuation values from the initial data that were acquired in a portion of the initial scan path sector corresponding to the additional scan path sector;

means for calculating additional attenuation values from the additional data;

means for subtracting the initial attenuation values from the additional attenuation values to determine difference values; and

means for back-projecting the difference data to produce the image data matrix.

41. A scanner for producing a CT image of a region of interest within the body of a subject, comprising:

means for reconstructing a CT image of a slice of the body;

means for defining the region of interest; and

means for updating the CT image only in the region of interest, wherein the image of the region of interest encompasses only a portion of the CT image of the slice.

42. A scanner according to claim 41, and comprising means for superimposing the CT image of the region of interest on another CT image encompassing a substantially greater portion of the cross-sectional area.

43. A scanner according to claim 42 and including the apparatus of any of claims 29-40 for producing the updated image of the region of interest.

44. A scanner according to any of claims 41-43 including means for determining the region of interest based on an expectation of change in the CT image in the region of image.

45. A scanner according to any of claims 41-44, and including means for identifying an object of interest and for defining the region of interest in response to a determination of the position of the object of interest.

46. A scanner according to claim 45 and comprising means for altering the region of interest being reconstructed in response to movement of the object.

47. A scanner according to claim 46, wherein the means for altering the region of interest in response to movement of the object comprises means for determining a characteristic of the X-ray attenuation data indicative of the position of the object, and means for shifting the region of interest being reconstructed in response to a change in the characteristic.

48. A scanner according to claim 47, wherein the means for determining the characteristic of the X-ray attenuation data comprises means for finding an extremum value of the data within a data window corresponding to the region of interest.



AMENDED SHEET

49. A scanner according to claim 48, wherein the means for finding the extremum value of the data comprises means for preprocessing the data and finding a maximum value of the pre-processed data.

50. A scanner according to any of claims 45-49 wherein the CT image is a multi-slice image and wherein the position of the slices are determined based on a determination of the position of the object with respect to the slices.

51. A CT scanner including means for determining an optimal position for multiple CT slices, comprising:

means for reconstructing the multiple slices based on a first set of data;

means for determining the position of an object in the slices; and

means for then reconstructing the slices based on the determined position.

52. A scanner according to claim 51 and including means for periodically updating the image only in the region of interest.

53. A CT scanner for imaging a region in a region of interest in which changes are expected comprising:

means for reconstructing a CT image from a plurality of views; and

means for periodically modifying the image only in the region of interest.

54. A scanner according to any of claims 41-50 or 53 wherein the image is periodically modified utilizing the method of any of claims 1-12.